НЕЙРОПСИХОЛОГИЧЕСКАЯ ДИАГНОСТИКА У МУЖЧИН С НАРУШЕНИЕМ ХОДЬБЫ

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Аннотация: Хронические нарушения мозгового кровообращения (дисциркуляторная энцефалопатия (ДЭ)) — один из наиболее распространенных диагнозов в практике врача-невролога, имеющий сложные патомеханизмы развития, и приводящий не только к физической, но и психической дезадаптации, инвалидизации пациентов и, соответственно, снижению качества жизни. Кроме того, в последние годы увеличилось количество больных с хронической венозной недостаточностью.

Методы. Обследовано 69 больных с ДЭ (49 больных с венозной недостаточностью ног, 20 больных с синдромом Лериша, средний возраст 53±5,9). Всем больным проведены: клинико-неврологическое обследование, биохимия крови (развернутая)); ЭЭГ, ЭКГ, мониторирование артериального давления, МРТ головы и шеи, ультразвуковая допплерография сосудов нижних конечностей и малого таза, транскраниальное и дуплексное сканирование брахиоцефальных сосудов; осмотр офтальмолога (с исследованием состояния сосудов глазного дна), тест МоСа.

Результаты. Анализ качества ходьбы у пациентов показал наличие перемежающейся хромоты, боли и отечности в ногах, судорожных подергиваний в ногах (в ночное время), нарушение синдрома «беспокойных ног» в 100% случаев. При клинико-неврологическом обследовании выявлены двигательные и чувствительные сдвиги различной частоты, от незначительных мелкоочаговых признаков до значимых изменений в 99% случаев. По данным сонографии сосудов отмечено снижение скорости кровотока как в каротидном, так и в вертебробазилярном бассейнах. При сравнении нарушенных изменений кровотока периферического кровоснабжения и основного выявлена корреляционная связь, что имеет важное значение для предпосылок хронического и острого нарушения мозгового кровообращения. Анализ результата по шкале МоСа показал, что у 56% пациентов с венозной недостаточностью выявлена легкая степень когнитивных нарушений, тогда как у пациентов с синдромом Лериша в 60% случаев выявлена умеренная степень когнитивных нарушений, что напрямую коррелирует с показателями, подтверждающими стеноз более 30%.

Заключение. Мужчин старше 45 лет с жалобами на утомляемость, снижение внимания и памяти, нарушение ходьбы и дискомфорт в области бифуркации сосудов следует относить к группе риска и рекомендовать им проведение профилактических осмотров для исключения сосудистой патологии и предупреждения развития хронической ишемии головного мозга и острых нарушений мозгового кровообращения.

Ключевые слова: хроническая ишемия мозга, нарушение ходьбы, нейропсихологическая диагностика.

NEUROPSYCHOLOGICAL DIAGNOSIS IN MEN WITH WALKING IMPAIRMENT

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Abstract: Chronic disorders of cerebral circulation (dyscirculatory encephalopathy (DE)) is one of the most common diagnoses in the practice of a neurologist, which has complex pathomechanisms of development, and leads not only to physical, but also to mental maladaptation, disability of patients and, accordingly, to a decrease in the quality of life. In addition, the number of patients with chronic venous insufficiency has increased in recent years.

Methods. 69 patients with DE were examined (49 patients with venous insufficiency of the legs, 20 patients with Leriche's syndrome, mean age 53±5.9). All patients underwent: clinical and neurological examination, blood biochemistry (detailed)); EEG, ECG, blood pressure monitoring, MRI of the head and neck, Doppler ultrasound of the vessels of the lower extremities and small pelvis, transcranial and duplex scanning of brachiocephalic vessels; examination by an ophthalmologist (with a study of the state of the vessels of the fundus), MoCa test.

Results. An analysis of the quality of walking in patients showed the presence of intermittent claudication, pain and swelling in the legs, convulsive twitching in the legs (at night), a disturbance of the "restless legs" syndrome, in 100% of cases. Clinical and neurological examination revealed motor and sensory shifts of varying frequency, from minor small-focal signs to significant changes in 99% of cases. According to the sonography of the vessels, a decrease in blood flow velocity was noted both in the carotid and in the vertebrobasilar basins. When comparing disturbed changes in the blood flow of the peripheral blood supply and the main one, a correlation was found, which is important for the prerequisites for chronic and acute cerebrovascular accident. Analysis of the result on the MoCa scale showed that in 56% of patients with venous insufficiency, a mild degree of cognitive impairment was detected, while in patients with Leriche's syndrome, a moderate degree of cognitive impairment was identified in 60% of cases, which directly correlates with indicators confirming stenosis more than 30%.

Conclusion. Males over 45 with complaints of fatigue, reduced attention and memory, impaired walking and discomfort in the area of vascular bifurcation should be classified as at risk and recommended to conduct preventive examinations to exclude vascular pathology and prevent the development of chronic cerebral ischemia and acute cerebrovascular accidents.

Keywords: chronic cerebral ischemia; walking disorders; neuropsychological diagnostics.

INTRODUCTION

The most discussed problem over the past decade among specialists (neurologists, psychiatrists, psychologists, therapists, endocrinologists, neurosurgeons) remains the issue of dyscirculatory encephalopathies, or chronic disorders of cerebral circulation, in particular, the state of the cognitive and psycho-emotional level [1, 3, 5, 9]. The process of dyscirculatory encephalopathy (DE) refers to the mechanism of slow progressive disorders in the vascular system of the brain [2, 5, 6, 10]. However, modern sources of scientific literature, for the most part, are aimed at studying the main vascular flow of "red blood", arterial blood (the established name) of oxygenated blood of the systemic circulation [3, 7, 9, 11], at the same time, little attention is paid to "venous blood" returning to the heart.

The vessels of the vein wall have structural features, in addition, the specificity of work in the brain [1, 4, 5, 8, 12]. So, for example, the venous system consists of a larger volume of vessels, and contains 80% of the blood from the total volume [6, 12, 13, 17, 21]. The level of exit of the venous outflow from the head is disturbed for several reasons: it is a prolonged cough, childbirth, neck compression, difficulty in nasal breathing [14, 15, 18, 20, 22]. Due to a sedentary lifestyle, increased statistical stress, the number of people with venous diseases has increased, such as vein thrombosis in combination with sinus thrombosis, thrombophlebitis of the extremities [15, 16, 19, 20].

Chronic ischemia of the lower extremities, described in 1923 by Leriche, the percentage of the disease of this symptom complex has a progressive projection due to the urbanization of the population, unhealthy lifestyle and nutrition, smoking, sedentary state. In 2007 Gusev E.I., Schmidt E.V. in their works explain cerebrovascular disorders against the background of pathologically significant and functionally compensatory blood flows with an emphasis on collaterals of the peripheral blood supply (stenosis, vascular reactivity), the question remains open, early signs of cognitive change in patients with chronic cerebral ischemia against the background of venous encephalopathy, combining comorbidity in the form of Leriche's syndrome, or patients with walking disorders.

Aim of the study. Conduct neuropsychological diagnosis of male patients with walking disorders.

MATERIAL AND RESEARCH METHODS

For the period 2021-2023, male patients aged 45 to 59 years were selected (according to WHO - the average age trend). An early review of the literature provides a description of the disease associated with Leriche's syndrome; obliterating atherosclerosis of the lower extremities, or occlusive aorto-iliac disease of the vascular system, which has a predominantly gender predisposition. In addition, the selection of patients for the study is focused on venous pathology detected in the lower extremities (venous vasodilation, thrombophlebitis, thrombi in the popliteal fossa). Thus, patients had a mean age of ≈56 years. For the study, by the method of exclusion (young and old age, women, patients with diabetes mellitus, chronic somatoform diseases, early participants in other studies), 69 men of the main group were selected with written consent, 20 conditionally/relatively healthy men were taken into the control group, having no problem of venous disorders in limbs.

The healthy group was selected during the period of preventive examination for the period 2021-2023, territorially in the polyclinic of the MC of SamSMU (Multiprofile Clinic of the Samarkand State Medical University).

Patients were examined (all without exception) by specialists: neurologist, psychologist, psychiatrist, neurosurgeon, vascular surgeon, therapist (cardiologist). The use of paraclinical additional diagnostic methods in accordance with the standards inherent in the disease DE for 2019 28.10. No. 266, Uzbekistan.

Laboratory tests (blood biochemistry (detailed)); EEG, ECG, blood pressure monitoring, MRI of the head and neck, Doppler ultrasound of the vessels of the lower extremities and small pelvis, transcranial and duplex scanning of brachiocephalic vessels; examination by an ophthalmologist (with a study of the condition of the vessels of the fundus).

In accordance with the goal and objectives, patients underwent neuropsychological testing to assess the level of cognitive impairment. Using the recommendations of Turustikova S.T. (2022) of a literature review on the use of neuropsychological testing, the choice fell on the MoCa (Montreal Cognitive Assessment Scale), developed in 2003, unlike other scales, this one makes it possible to assess minimal (moderate) cognitive changes. It also covers the level of attention, concentration, memory skill, thinking, counting and orientation in the environment of the executive function.

At the time of the study, the main group was divided into patients with Leriche's syndrome, 20 patients; the second group of patients with venous insufficiency of the legs, 49 patients; control group of 20 people. Statistical processing of the material was carried out on an individual computer, in accordance with standard Student's criteria, where $p<0.05$.

RESEARCH RESULTS AND DISCUSSION

The main group (MG) consisted of male patients aged, statistically average 53±5.9 years. Despite the fact that the patients were divided into two groups, the entire main group had a common subjective and somato-neurological symptoms characteristic of the category of patients with signs of discirculatory encephalopathy.

At the time of examination, the reason for the patients to see a doctor were complaints of headache in 93.2%, dizziness in 89.9%; memory loss 93.3%, emotional instability 88.8% of cases; insomnia in 92%, and as a result, a decrease in working capacity in 81.1%. A separate emphasis during the examination of the persons of the MG is made on the quality of walking of patients, which radically distinguish the main group from the control group: intermittent claudication, soreness and swelling in the legs (more in distal parts); convulsive twitching in the legs (at night); disturbance of the type of restless legs syndrome, in 100% of cases. In 70% of cases, men complained of a decrease in potency. In addition, patients noted the instability of blood pressure, then a sharp rise, then a sharp drop. In 93% of cases, the studied men were overweight, where obesity of the 2nd degree was in 57% of cases.

On electrocardiography, patients in 15% of cases had signs of tachycardia or arrhythmia, which is most likely associated with a change of the metabolic process; in 7% of cases there was left ventricular failure.

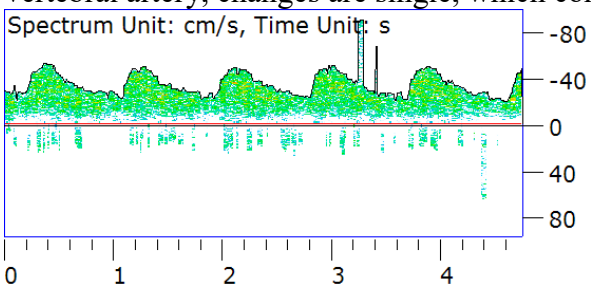
Clinical and neurological examination of patients revealed motor and sensory shifts of varying frequency, from minor small-focal signs (smoothness of the nasolabial fold, impaired convergence, difficulty in retracting the eyeballs, slight deviation of the tongue); to significant changes (asymmetry in the height of reflexes, changes in sensitivity according to the type of hemisyndrome) in 99% of cases. Coordinating tests in 66.9% of cases, in the main group, had one of the signs (unsteadiness, disturbance of statics in the Romberg position; slight overshoot on one side during the finger-nose test). Evaluation of the results of clinical, neurological and instrumental examinations is presented in table 1.

Table 1. The result of the analysis of clinical, neurological and instrumental examination of patients of the main group and the control group (%)

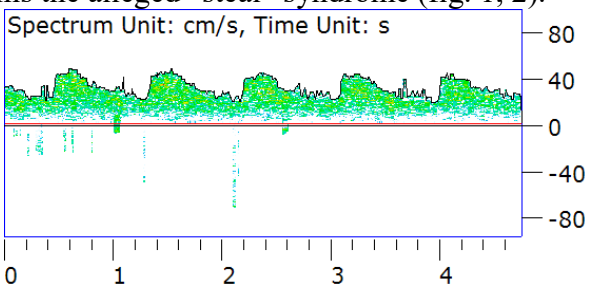
№	Parameters	Group 1 DE + Leriche syndrome n=20	Group 2 DE+ venous insufficiency n=49	Group 3 control group n=20	p
1	Headache	100	82±1,3	54	<0,05
2	Dizziness	87,5±5,3	62,1±1,8	20	<0,05
3	Sleep disturbance	65,1±4,5	60±1,9	10	<0,05
4	Fatigue	87,9±1,5	74,4±1,5	10	<0,05
Walking disorder					
5	Intermittent claudication	100	-	-	
6	Pain and swelling in the legs	100	70	-	<0,05
7	Shuffling	-	15	-	
8	Trophic changes in the legs	100	30,3±2,4	-	<0,05
9	Loss of sensation in the legs	81,7±1,5	41±1,9	-	
10	No pulsation in the legs	100	28,3±1,1	-	
11	Convergence disturbance	50±10,3	37,8±1,5	10	
12	Eyeball restriction	38,2±9,3	19,9±9,3	-	
13	Tongue deviation	16,6±3,5	8,9±2,1	-	
14	Reflex asymmetry				
	- from hands	98,5±1,5	65,1±1,5	-	<0,05
	- from feet	100	83,3±1,5	-	<0,05
15	Oral automatism	16,1±5,5	14,1±3	-	
16	Marinescu-Radovic reflex	16,1±5,5	14,1±3	-	
17	Impaired coordination				
	- Romberg pose	68±1,3	26±2,0	-	
	- unsteadiness	24±1,5	20,1±1,3	-	
	- finger-nose	55,5±3,3	20,1±1,3	-	
Neuroimaging (MRI) of the brain					
18	Brain atrophy	65	59,1±1,3	20	
19	Leukorheosis	100	50	-	
20	Foci of ischemia	46,5	16,7±1,3	-	
21	Expansion of the ventricles	53,7±1,9	30,3±1,7	23,2	

The research and study of venous circulation is an important step in the evaluation of the analysis of the result of cerebral hemodynamics, where changes in hemodynamic parameters were

noted in the examined patients of the main group. Thus, according to the data of vascular sonography, it can be seen that a decrease in blood flow velocity by the type of a decrease in the linear blood flow velocity (LBF) on both sides of the carotid basin, where a reduced level prevails in the projection of the middle cerebral artery (MCA) on the side of stenosis 50.0 ± 2.5 cm/sec (by average). A slight increase in LBF is also insilateral, that is, on the same side of the cerebral hemisphere, which, according to average values, is 56.9±2.1 cm/sec; in addition, contralaterally, along the posterior cerebral artery (PCA), it has an average value of 33.5± 8.0 cm/sec. These values reflect the pressure drop in the areas of blood supply (perfusion) on both sides of the carotid basin, affecting the vascular bed of the vertebrobasilar basin. Despite the relative identity of clinical, neurological and instrumental parameters between groups of MG, group 1 showed a peculiarity of the prevalence of tortuosity of the internal carotid and vertebral arteries in the form of the letters C and S; stenosis was found in 62% of cases on the internal carotid artery; on the part of the vertebral artery, changes are single, which confirms the alleged “steal” syndrome (fig. 1, 2).

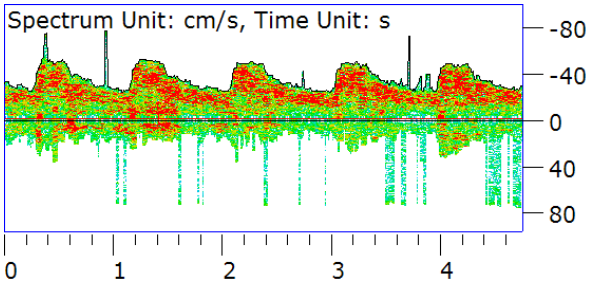


Mean: 31,8 Peak: 51,3 SBI: 0,38
PI: 0,92 Dias: 22,0 STI: 0,34
RI: 0,57 S/D: 2,33



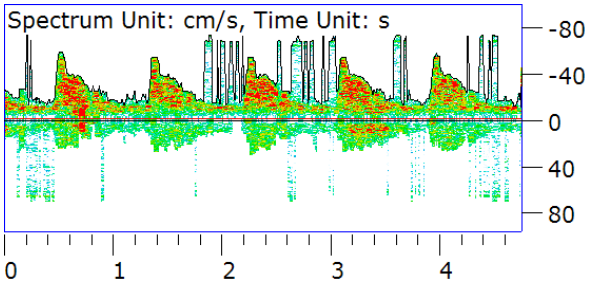
Mean: 29,1 Peak: 46,1 SBI: 0,37
PI: 0,87 Dias: 20,6 STI: 0,33
RI: 0,55 S/D: 2,24

R ACA 51 mm -



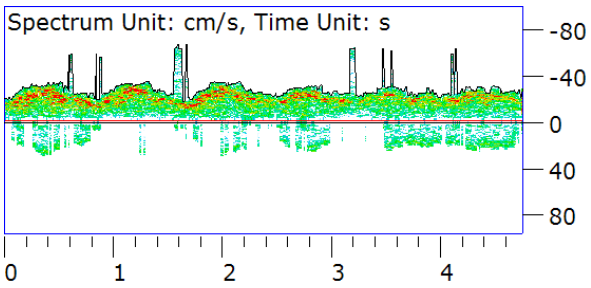
Mean: 42,2 Peak: 75,6 SBI: 0,44
PI: 1,19 Dias: 25,5 STI: 0,40
RI: 0,66 S/D: 3,00

L ACA 45 mm -



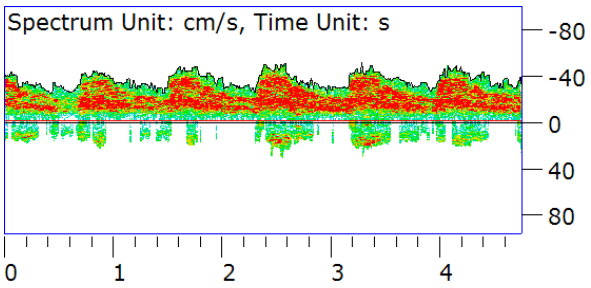
Mean: 32,4 Peak: 72,5 SBI: 0,55
PI: 1,86 Dias: 12,3 STI: 0,50
RI: 0,83 S/D: 5,88

R VA 56 mm -



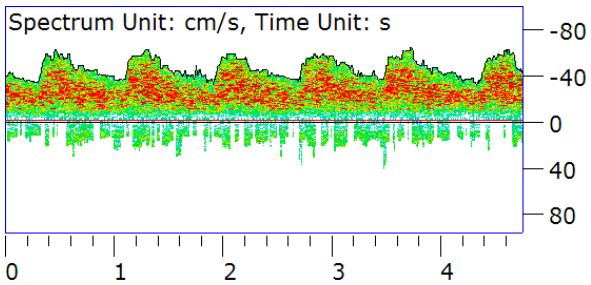
Mean: 30,6 Peak: 57,9 SBI: 0,47
PI: 1,34 Dias: 17,0 STI: 0,42
RI: 0,71 S/D: 3,41

L VA 60 mm -



Mean: 32,2 Peak: 46,9 SBI: 0,31
PI: 0,68 Dias: 24,8 STI: 0,28
RI: 0,47 S/D: 1,89

BA 75 mm -



Mean: 42,9 Peak: 60,2 SBI: 0,29
PI: 0,60 Dias: 34,3 STI: 0,26
RI: 0,43 S/D: 1,76

Fig. 1. Patient A., 55 years old. An increase in speed parameters in the middle cerebral artery, anterior cerebral artery and vertebral artery on the right. Hypertonicity of the arterial bed.

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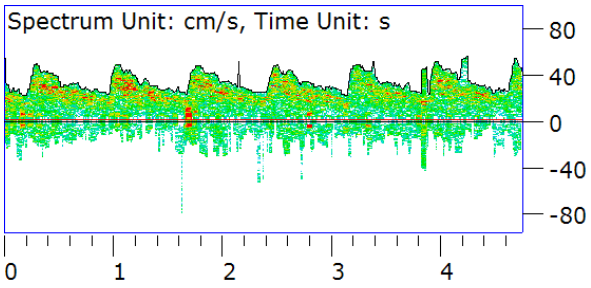
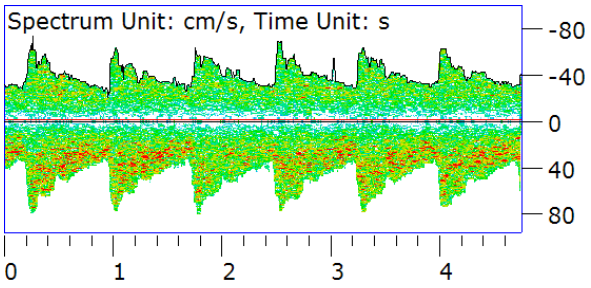
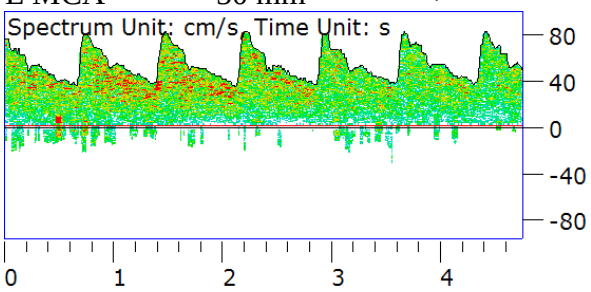


Mean: 31,7 Peak: 51,1 SBI: 0,38
PI: 0,92 Dias: 22,0 STI: 0,34
RI: 0,57 S/D: 2,33



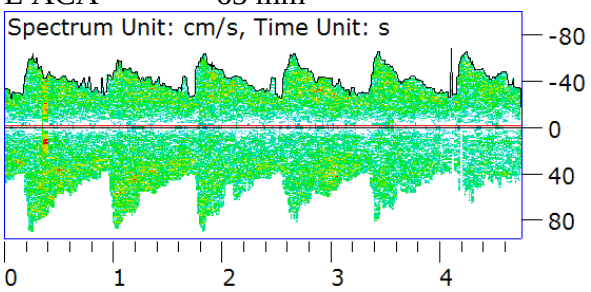
Mean: 39,5 Peak: 66,0 SBI: 0,40
PI: 1,01 Dias: 26,2 STI: 0,36
RI: 0,60 S/D: 2,58

L MCA 50 mm +



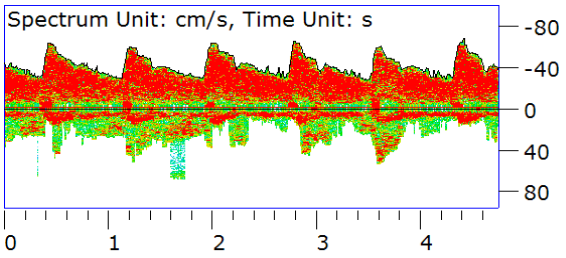
Mean: 50,6 Peak: 79,5 SBI: 0,36
PI: 0,86 Dias: 36,1 STI: 0,33
RI: 0,55 S/D: 2,20

L ACA 65 mm -



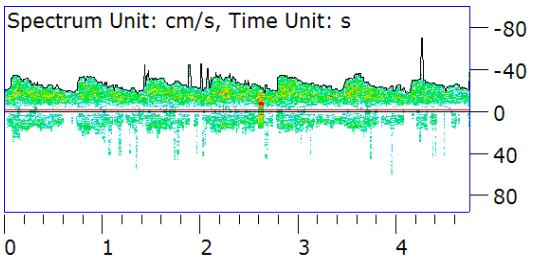
Mean: 37,4 Peak: 60,7 SBI: 0,38
PI: 0,94 Dias: 25,7 STI: 0,35
RI: 0,58 S/D: 2,36

L ACA 45 mm -



Mean: 39,9 Peak: 61,7 SBI: 0,35
PI: 0,82 Dias: 29,1 STI: 0,32
RI: 0,53 S/D: 2,12

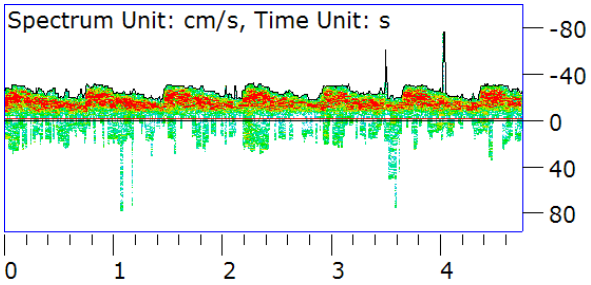
R VA 60 mm -

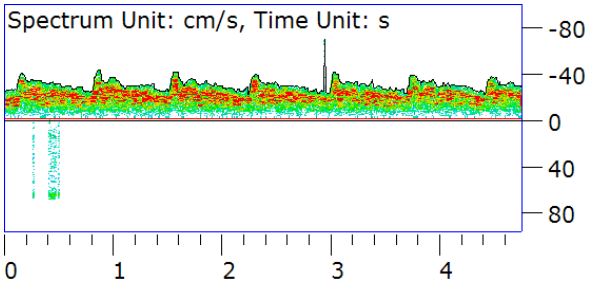


Mean: 23,9 Peak: 38,6 SBI: 0,37
PI: 0,90 Dias: 16,6 STI: 0,34
RI: 0,56 S/D: 2,32

L VA 60 mm -

BA 75 mm -





Mean: 23,1	Peak: 34,7	SBI: 0,30	Mean: 29,0	Peak: 41,1	SBI: 0,30
PI: 0,69	Dias: 17,3	STI: 0,27	PI: 0,63	Dias: 22,9	STI: 0,27
RI: 0,45	S/D: 2,02		RI: 0,44	S/D: 1,80	

Fig. 2. Patient B., aged 57, asymmetry of velocity parameters in the intracranial arteries. An increase in speed parameters along the anterior cerebral artery on the left. Difficulty perfusion in the vertebral arteries on both sides.

The MRI parameters of the brain are presented in Table No. 1 and, as an example, a figure.

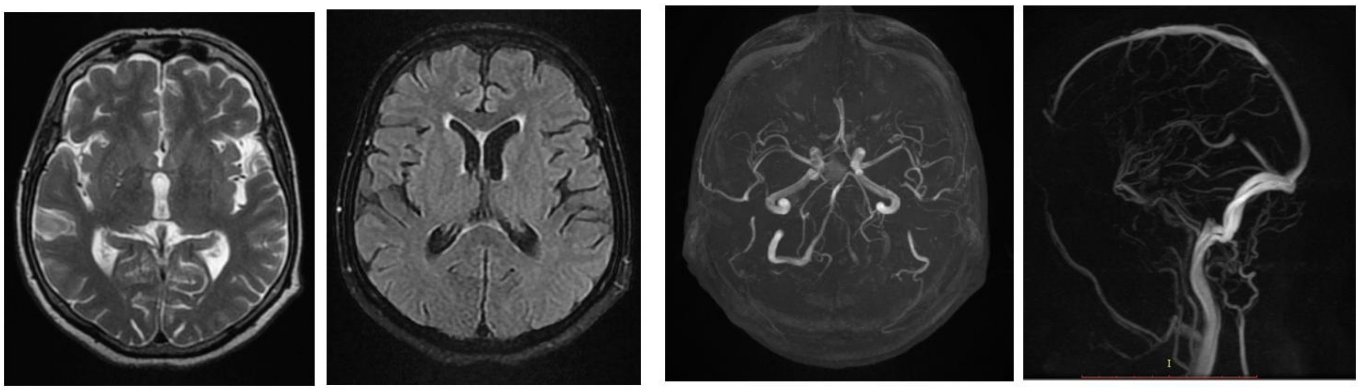


Fig. 3. Patient V., 58 years old, with Leriche's syndrome and dyscirculatory encephalopathy. On MRI: A, B - signs of atrophy of the cortex and substance of the brain. **C – MR angiography of cerebral vessels reveals:** moderate decrease in blood flow in the siphon of the right ICA, moderate narrowing and decrease in blood flow in the A1 segment of the right ACA, local narrowing and decrease in blood flow in the M2 and M3 segments of the left MCA, narrowing and decrease in blood flow in both PCA, tortuosity in the course of the peripheral branches of both MCA, narrowing and decrease in blood flow in the left VA. **D – MR-venogram in sagittal and coronal projection visualized** the veins and venous sinuses of the brain. There is a moderate decrease in the intensity of the MR signal from the blood flow through the sagittal sinus

The initial examination of patients revealed the presence of complaints of intermittent claudication, pain in the legs, this was the reason for a separate diagnostic examination of patients for angiography of the brain, in a group of men with signs of Leriche's syndrome, taking into account the high changes in disorders identified in this group.

According to MR angiography, lesions on both sides of the hemispheres were noted in 93% of cases, with significant hemodynamic stenosis detected in 56%. In 40% of cases, stenosis is determined on the side of the bifurcation of the abdominal aorta, according to angiography of the internal vascular plexus, in 36% of the area of the iliac artery outside; the remaining percentage is occupied by the vessels of the femoral artery on the superficial side (in the lower third of the thigh).

Examination by a vascular surgeon, gives a description of the visual examination, where numerous narrowing of the lumen was noted, on ultrasound of the vessels of the legs, it appears as a contour of an uneven flow. When comparing disturbed changes in the blood flow of the peripheral blood supply and the main one, a correlation was found, which is important for the

prerequisites for chronic and acute cerebrovascular accident, it should be noted as one of the factors of cerebrovascular diseases. The study indicators confirm the scientific literature (2017,

Framing study, in patients with Leriche's syndrome, life expectancy is reduced by 1.6 times).

Analysis of the result of neuropsychological testing in a comparative aspect was carried out on the MoCa scale. The predominance of mild cognitive changes in group 2 revealed 56%, a moderate degree of deficiency is 38%. At the same time, in group 1, the advantage was due to a moderate degree of cognitive impairment 60%, a mild degree of dysfunction 40%. Accordingly, in the main group there is disorders of cognitive function, while in group 1, these changes predominate, which directly correlates with indicators confirming stenosis of more than 30%.

Patients of the main group, upon admission in the initial position, used in the expression of their main complaints, the word "weariness", "apathy", "fatigue", "laziness" and "lack of interest" in the environment. A longitudinal study of European scientists over the past decade (a socio-psychological survey) notes that "fatigue" is normative in older people, and "pathological fatigue", one of the first signs in patients with chronic cerebrovascular accident, in particular, having a comorbid somatic background of chronic diseases, (diabetes mellitus, arterial hypertension) (Caruana E.J. 2015, Choi-Kwon S et al 2013, Duncan F et al 2014). In 2010, researcher Naess, for the first time, presented the relationship between pain and fatigue, and proposed the use of scales to identify "pathological fatigue". In the examined patients of the main group, the fact of pathological fatigue was ambiguous, on the one hand, these are signs of age-related changes, on the other hand, changes characteristic of structural changes in the central nervous system against the background of vascular dysfunctions, in particular venous encephalopathy. In addition, walking disorders associated with changes in the system of peripheral venous insufficiency. As a result, according to the scale of "pathological fatigue" proposed by Naess (2010), significant insufficiency was found in group 1 from 6 to 12 limits, in group 2 from 10 to 16 limits, where $p = 0.04$. Correlation relationship between neuropsychological testing on the MoCa scale, in comparison with "pathological fatigue" (on the scale), where $p=0.01$. Thus, cognitive deficiency is dependent on pathological fatigue, and in group 1 with Leriche's syndrome, pathological lameness increases both pathological fatigue and aggravates cognitive deficit.

Conclusions

Summing up, in the course of the study of male patients aged 45 to 59 years, significant changes were found: 20 patients had clinically-instrumental-laboratory signs of Leriche's syndrome, 49 patients were diagnosed with venous insufficiency of the legs due to vascular surgeons; all patients are presented in a single main group, with signs of chronic cerebrovascular accident (DE). The work presents the pathomechanism of aggravation of dysfunction of the central nervous system and the progression of such indicators as cognitive deficit and pathological fatigue. The fact that gait is disturbed is in itself one of the early signs of DE, where the breakdown of the gait pattern, or deterioration in locomotion, leads to aproxic gait. Confirmation is instrumental research methods, where on MRI, there is a feature of signs of leukoaraiosis framing the anterior lateral ventricles. In addition, structural and vascular parameters are clearly changed, which requires research, diagnosis for the presence of chronic aortic blockages and occlusions that disrupt the flow of the vascular bed, large and small vessels. Thus, practitioners should be advised in their daily work that men over 45 years of age should be included in the risk group if complaints raise the issue of pain in the area of vascular bifurcation, fatigue, decreased attention and memory. The contingent of such patients needs preventive examination, prevention of chronic and acute strokes.

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